

IN THE CLAIMS:

1. (Currently Amended) Wireless radiofrequency data system comprising:

a base-station comprising N multiple first sets and a signal processing-unit, wherein each first set comprises a transmitter and receiver unit provided with a transmitter and a receiver and at least one antenna which is connected to the transmitter and receiver unit, wherein the signal processing-unit is connected with each of the N first sets for processing signals received and to be transmitted by the N first sets and processing signals to be transmitted by the first sets, and

M multiple second sets with N greater than M, wherein each first set and each second set comprises a transmitter and receiver unit having at least one antenna and provided with a transmitter and a receiver that operate on essentially the same radiofrequency or radiofrequency-band, wherein and at least one antenna which is connected to the transmitter and receiver unit, characterised in that, the signal processing-unit is provided with an inputport for inputting M signals Q to be received by the respective M second sets and comprises information about the transfer-functions H of radiofrequency signals from each of the antennas of the N first sets to each of the antennas of the M second sets and/or vice versa, and wherein the transmitters and receivers, both in the N first sets and in the M second sets, operate on essentially the same radiofrequency or radiofrequency-band, and wherein the signal processing-unit processes the signals received and to be transmitted by the N first sets and processes the signals to be transmitted by the first sets on the basis of said transfer functions H such that for each second set of a plurality of the M second sets an individual communication channel is formed with the base-station wherein these communication channels are generated simultaneously and separately from each other, wherein the processing unit is arranged to process the M signals Q in combination on the basis of information of the transfer-functions H to establish

M of said simultaneous communication channels by processing on the basis of the information about the transfer-functions H , the M signals Q to obtain the N transmit-signals R , to be transmitted by the first sets to the second sets, according to

$$\underline{R} = \underline{P}_D \underline{Q}, \quad (\text{A})$$

resulting in that the M signals Q are received separately by the respective second sets if the second sets each receive the N transmit-signals, where $\underline{P}_D = [\underline{H}^* (\underline{H}^* \underline{H})^{-1}]^T$ is the pseudoinverse of \underline{H}^T and where \underline{H}^* is the complex conjugated and transposed of \underline{H} , wherein \underline{H} is a complex $[N \times M]$ matrix containing transfer functions $h_{ij} (i=1, \dots, N; j=1, \dots, M)$, wherein h_{ij} is the transfer function for transmission from the j^{th} second set of the M second sets to the i^{th} first set of the N first sets, and where \underline{Q} is a complex M dimensional vector $[Q_1, Q_2, \dots, Q_j, \dots, Q_M]^T$ wherein Q_j is the signal to be transmitted to the j^{th} second set of the M second sets and where $\underline{R} = [R_1, R_2, \dots, R_i, \dots, R_N]^T$ wherein R_i is the transmit-signal to be transmitted by the i^{th} first set of the N first sets.

2. (Original) Wireless radiofrequency data communication system according to claim 1, characterised in that, the communication channels are duplex communication channels.

Claims 3-6 (Canceled)

7. (Currently Amended) Wireless radiofrequency data communication system according to claim 106, characterised in that each second set comprises a serial-to-parallel/parallel-to-serial unit, which unit, in use, splits the data signal of said second set in a multiple of signals, an means for modulating these signals on different frequencies according to the Inverse Fast Fourier Transformation, and wherein each first set comprises a unit for executing a Fast Fourier Transformation on the signals received by said first set and means for combining the transformed signals in order to recover said data-signal.

8. (Original) Wireless radio-frequency data communication system comprising in use:

k₁ multiple first groups, wherein each first group comprises a transmitter-unit and at least one antenna which is connected to the transmitter-unit for transmitting a signal; and

k₂ multiple second groups, which each second group comprises a receiver-unit and at least one antenna which is connected to the receiver-unit,

characterised in that, the wireless radiofrequency data communication system further comprises a signal processing-unit which is $k_1 > k_2$ connected to each of, the first groups and which is, if $k_1 < k_2$, connected to each of, the second groups, wherein the signal processing-unit comprises information about the transfer-functions of radiofrequency signals from each of the first groups to each of the second groups, and/or vice versa, and wherein, each of the transmitter-units, of the first groups operates on essentially the same radiofrequency or radio frequency band, and wherein, in use, if $k_1 > k_2$, the signal processing-unit processes k₂ data-signals to be transmitted to the k₂ second groups for obtaining k₁ signals which are supplied to the respective first groups to be transmitted, where the k₂ data signals are processed on the basis of said transfer functions in such a manner that the respective second groups will receive separately the respective k₂ data-signals, thereby establishing k₂ simultaneous communication channels, and wherein, in use, if $k_1 < k_2$, the signal processing-unit processes k₂ signals, which are received by the respective second groups on the basis of said transfer functions in such way that an estimation is made of the k₁ signals transmitted by the first groups, thereby establishing k₁ simultaneous communication channels.

9. (Original) Wireless radiofrequency data communication system according to claim 8, characterised in that each first group comprises a serial-to-parallel.parallel-to-serial unit, which unit, in use, splits the data signal in a multiple of signals, and means for modulating these signals on

different frequencies according to the Inverse Fast Fourier Transformation, and wherein each second group comprises a unit for executing a Fast Fourier Transformation on the signal received by said second group and means for combining the transformed signals in order to recover said data-signal.

10. (New) Wireless radiofrequency data system comprising:

a base-station comprising N ~~multiple~~ first sets and a signal processing-unit, ~~wherein each first set comprises a transmitter and receiver-unit provided with a transmitter and a receiver and at least one antenna which is connected to the transmitter and receiver-unit, wherein the signal processing-unit is connected with each of the N first sets for processing signals received and to be transmitted by the N first sets and processing signals to be transmitted by the first sets, and~~

M ~~multiple~~ second sets with N greater than M, wherein each first set and each second set comprises a transmitter-and receiver-unit having at least one antenna and provided with a transmitter and a receiver that operate on essentially the same radiofrequency of radiofrequency-band and, in use, each of the M second sets transmits a signal so that M signals are transmitted to be received in combination by the N first sets, wherein ~~and at least one antenna which is connected to the transmitter and receiver-unit, characterised in that, the signal processing-unit comprises information about the transfer-functions H of radiofrequency signals from each of the antennas of the first sets to each of the antennas of the second sets and/or vice versa, and wherein the transmitters and receivers, both in the first sets and in the second sets, operate on essentially the same radiofrequency or radiofrequency-band, and wherein the signal processing-unit processes the signals received and to be transmitted by the N first sets and processes the signals to be transmitted by the first sets on the basis of said transfer functions H such that for each second set of a plurality of the M second sets an individual communication channel is formed with the base-station wherein these communication~~

channels are generated simultaneously and separately from each other, wherein the signal processing unit is arranged to recover the M signals transmitted by the M second sets separately from each other, thereby obtaining M of said simultaneous communication channels, by processing on the basis of the information about the transfer-functions H, the signals r which are received by the first sets, to calculate an estimation \underline{x}_{est} of the M signals \underline{x}^c which were transmitted by the M second sets, according to the mathematical expression

$$\underline{x}_{est} = \underline{P}_0 \underline{r}, \quad (B)$$

where $\underline{P}_0 = [(\underline{H}^* \underline{H})^{-1} \underline{H}^*]$ is the pseudo-inverse for H and where \underline{H}^* is the complex conjugated and transposed of H, wherein H is a complex $[N \times M]$ matrix containing transfer functions h_{ij} ($i=1, \dots, N$; $j=1, \dots, M$), wherein h_{ij} is the transfer function for transmission from the j^{th} second set of the M second sets to the i^{th} first set of the N first sets, r is a complex N dimensional vector $[\underline{r}_1, \dots, \underline{r}_i, \dots, \underline{r}_N]^T$ with \underline{r}_i the signal received by the i^{th} first set of the N first sets, \underline{x}_{est} is a complex M dimensional vector $[\underline{x}_{est_1}, \dots, \underline{x}_{est_j}, \dots, \underline{x}_{est_M}]^T$ where \underline{x}_{est_j} is an estimation of \underline{x}_j^c , and wherein \underline{x}^c is a complex M-dimensional vector $[\underline{x}_1^c, \dots, \underline{x}_j^c, \dots, \underline{x}_M^c]^T$, with \underline{x}_j^c being the signal transmitted by the j^{th} second set of the M second sets.